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(54) IMAGE CONGEALING VIA EFFICIENT FEATURE SELECTION

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USPC 382/164, 171, 173, 179, 215; 711/206, 711/208, 209; 348/267 See application file for complete search history.

(56) References Cited

U.S. PATENT DOCUMENTS

5,629,988	A	5/1997	Burt et al.
6,020,930	A	2/2000	Legrand
7,035,434	B2	4/2006	Estevez
7,085,409	B2	8/2006	Sawhney et al.
7,274,803	B1	9/2007	Sharma et al.
7,711,155	B1	5/2010	Sharma et al.
7,742,623	B1	6/2010	Moon et al.
7,898,522	B2	3/2011	Hildreth et al.
	(Continued)		

OTHER PUBLICATIONS

Antoniak, Charles, Mixtures of Dirichlet Processes with Applications to Bayesian Nonparametric Problems, Annals of Statistics, 2:1152-1174, 1974, California.

(Continued)

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(57) ABSTRACT

A novel technique for unsupervised feature selection is disclosed. The disclosed methods include automatically selecting a subset of a feature of an image. Additionally, the selection of the subset of features may be incorporated with a congealing algorithm, such as a least-square-based congealing algorithm. By selecting a subset of the feature representation of an image, redundant and/or irrelevant features may be reduced or removed, and the efficiency and accuracy of least-square-based congealing may be improved.

20 Claims, 10 Drawing Sheets

